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#4



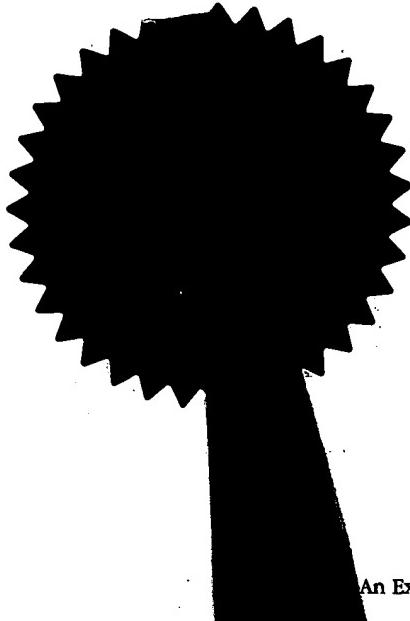
The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

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Signed *Evans.*

Dated 09 November 1999

CERTIFIED COPY OF
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(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form).

22 JUN 1999

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your Reference

P.5955

2. Patent application number

*(The Patent Office will fill in this part)***9914410.7****22 JUN 1999**3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

NEW TRANSDUCERS LIMITED
Stonehill
Huntingdon
Cambridgeshire
PE18 6ED
G.B.

Patents ADP number *(if you know it)*

7133119 003

If the applicant is a corporate body, give the country/state of its incorporation

G.B. *(T)*

4. Title of the invention

REFLECTOR

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

MAGUIRE BOSS
5 Crown Street
St. Ives
Cambridgeshire
PE17 4EB, G.B.

Patents ADP number *(if you know it)*

07188725001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number <i>(if you know it)</i>	Date of filing <i>(day/month/year)</i>
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing <i>(day/month/year)</i>
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.)
- See note (d)*

Patent Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.
Do not count copies of the same document

Continuation sheets of this form

Description

4

Claims(s)

Abstract

Drawing(s)

4

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination
(*Patents Form 10/77*)

Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date: 28/05/99

MAGUIRE BOSS

12. Name and daytime telephone number of person to contact in the United Kingdom

P.A. MAGUIRE

Tel: 01480 301588

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Notes

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5

TITLE: LOUDSPEAKERS

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DESCRIPTION

15 The invention relates to loudspeakers. More particularly, but not exclusively, the invention relates to resonant panel-form loudspeakers of the kind disclosed in International patent application WO97/09842 of New Transducers Ltd. Such resonant panel-form loudspeakers may
20 comprise a member having capability to sustain and propagate input vibrational energy by bending waves in at least one operative area extending transversely of thickness to have resonant mode vibration components distributed over said at least one area and have
25 preferential locations or sites within said area for transducer means and having a transducer mounted on said member at one of said locations or sites to vibrate the member to cause it to resonate forming an acoustic

radiator.

A resonant panel-form loudspeaker of this kind is characterised by a large area, low intensity diffuse acoustic radiation source with an almost spherical acoustic 5 radiation. In some applications this wide directivity might be a problem and method of control might be advantageous in such cases.

It is an object of the invention to assist in controlling the directivity of the acoustic radiation from 10 a loudspeaker, particularly a resonant panel loudspeaker.

From one aspect the invention is a loudspeaker comprising an acoustic radiator and reflector means for directing acoustic output from the radiator. The reflector means may be curved or planar. If planar it may comprise 15 more than one plane faces angled with respect to one another. If curved it may comprise a simple or compound curvature.

The reflector may be arranged to define a cavity or enclosure. The acoustic radiator may be disposed in the 20 cavity or enclosure. Thus, for example, if the reflector is formed as a parabolic reflector, the radiator may be positioned at the focus of the reflector.

The acoustic radiator may be of any kind, i.e. pistonic, but is preferably a resonant panel-form device, 25 e.g. of the kind described in International application WO97/09842. Thus the loudspeaker may comprise a member having capability to sustain and propagate input vibrational energy by bending waves in at least one

operative area extending transversely of thickness to have resonant mode vibration components distributed over said at least one area and have locations or sites within said area for transducer means and having a transducer mounted on 5 said member at one of said locations or sites to vibrate the member to cause it to resonate forming an acoustic radiator which provides an acoustic output when resonating.

The reflector may be mounted to the radiator, or the radiator mounted to the reflector, using a compliant 10 suspension. The reflector may be a horn as described in our co-pending patent application GB 9726070.8.

While a parabolic reflector may be optimal at producing an approximation of a non-divergent beam of sound, it is by no means the only solution. Indeed the use 15 of a simple cone, or a conic section revolved about its axis may give some beneficial increase in the directivity of the acoustic radiation. If control of beam-width is only required in one plane, then a cylindrical reflecting surface may be suitable.

20 Because of the diffuse nature of the acoustic radiation of a distributed mode loudspeaker, use of any combination of reflecting surfaces could be used to advantage in directing the sound energy into preferred directions. A conventional specular loudspeaker device 25 would have to contend with interference effects caused by different path lengths.

The invention is diagrammatically illustrated, by way of example, in the accompanying drawings in which:-

Figure 1 is a perspective view of a first embodiment
of loudspeaker device;

Figure 2 is a section on the line A-A of Figure 1;

Figure 3 is a perspective view of a second embodiment
5 of loudspeaker device;

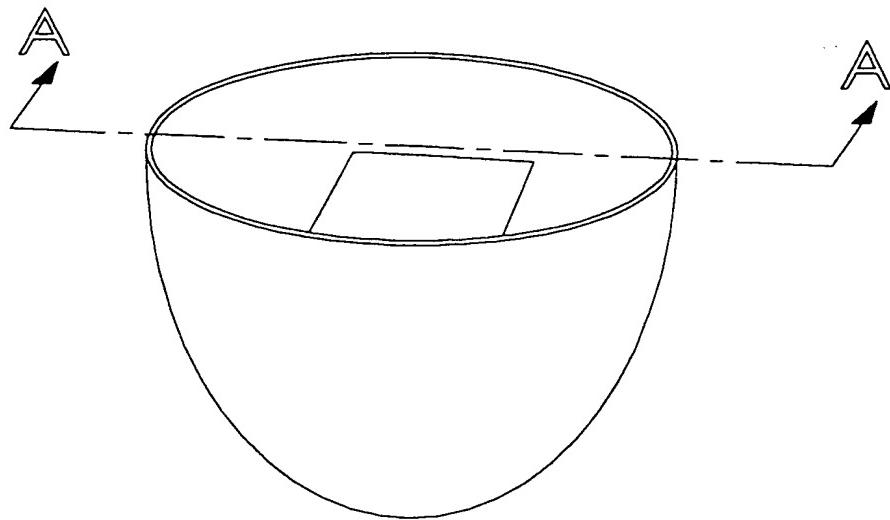
Figure 4 is a section through a third embodiment of
loudspeaker device;

Figure 5 is a section through a fourth embodiment of
loudspeaker device, and

10 Figure 6 is a section through a fifth embodiment of
loudspeaker device.

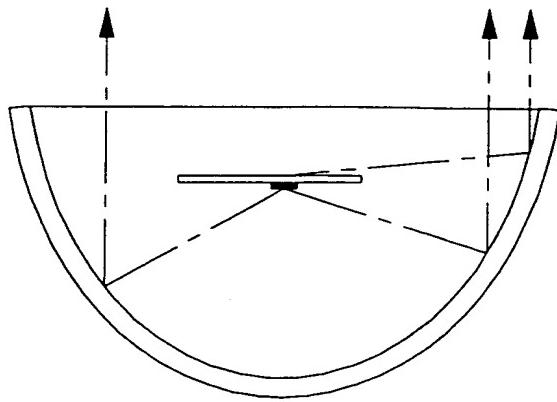
The invention this provides novel loudspeaker means.

Figure 1.



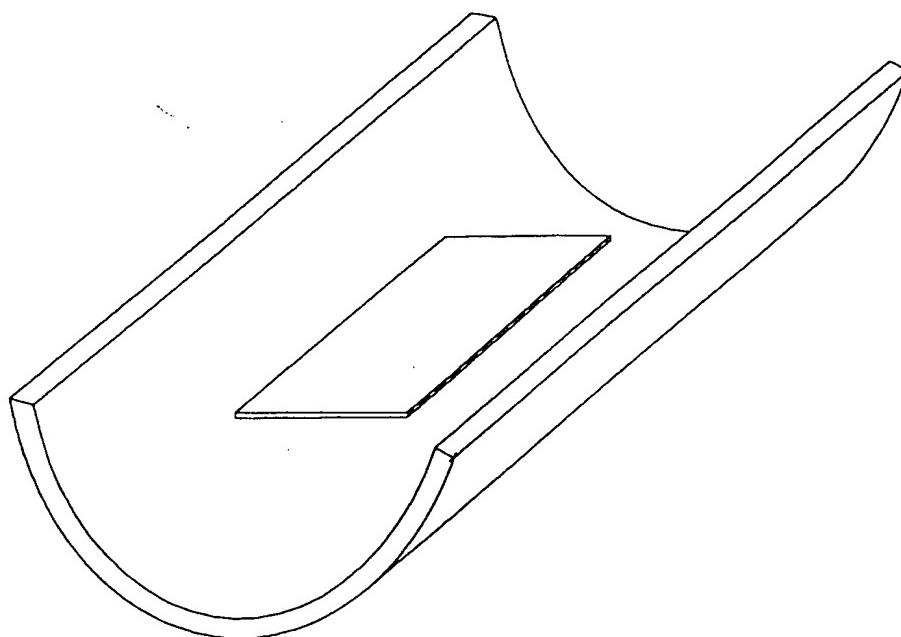
Parabolic dish with DML -prefered placement is with transducer at focus.

Figure 2.



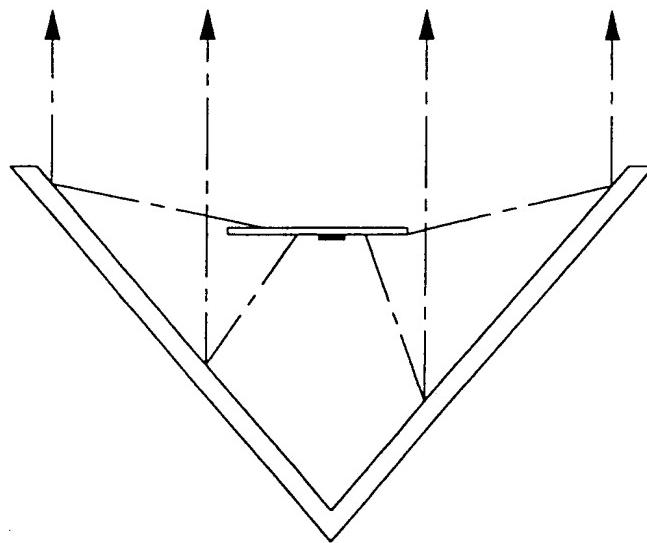
Cross-section on A-A showing direction of sound propagation.

Figure 3.



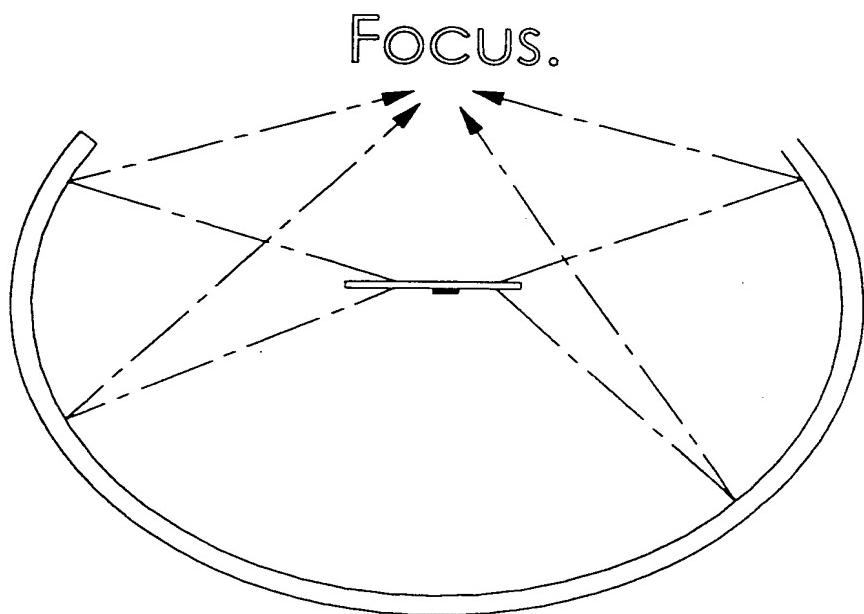
Parabolic cylinder example.

Figure 4.



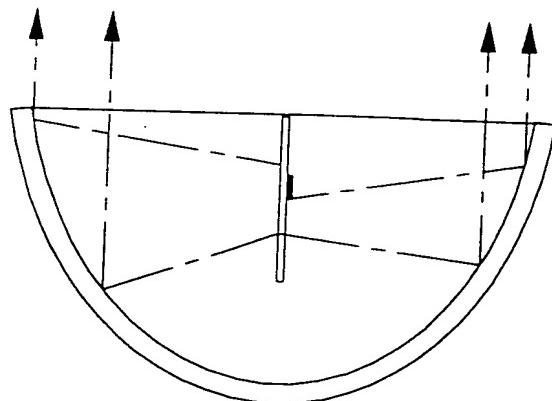
Non-ideal, but effective cross -section
either conical or triangular prism.

Figure 5.



Using an elliptical bowl to focus sound.

Figure 6.



Alternative positioning of DML
relative to reflector.